

Honors Chemistry Fall Semester Final Exam

Part 2: Multiple Choice

Name: KEY Period: _____ Date: _____

This part of the final exam is worth 80 points. Please do not mark on the exam but record your responses on the scantron sheet using a number 2 pencil. Good luck!

1) Which of the following represents a valid hypothesis?

E

- A) Neon does not react with oxygen.
- B) Sodium metal reacts violently with water.
- C) Lead is soft and malleable.
- D) Oxygen is a gas at room temperature.
- E) Metals tend to lose electrons.

2) Identify a liquid.

D

- A) oxygen
- B) copper
- C) salt
- D) mercury
- E) sugar

3) A substance that can't be chemically broken down into simpler substances is

B

- A) a homogeneous mixture.
- B) an element.
- C) a heterogeneous mixture.
- D) a compound.
- E) an electron.

4) Decanting is

C

- A) a process in which the more volatile liquid is boiled off.
- B) dissolving a solid into a liquid.
- C) separating a solid from a liquid by pouring off the liquid.
- D) pouring a mixture through a filter paper to separate the solid from the liquid.
- E) heating a mixture of two solids to fuse them together.

5) Identify the unit of measurement which is a SI base unit of measurement.

A

- A) second
- B) Celsius
- C) cup
- D) pound
- E) yard

6) The outside temperature is 45°C, what is the temperature in K?

A) -238 K

B) 308 K

C) 95 K

D) 31 K

E) 318 K

E

7) What wavelength of light would you report in units of nm, if the light had a wavelength of 7.60×10^{-10} m?

A) 7.60×10^{-3} nm

B) 7.60×10^{-19} nm

C) 1.32 nm

D) 0.760 nm

E) 760 nm

D

8) The factor 1,000,000 corresponds to which prefix?

A) deka

B) deci

C) mega

D) milli

E) None of the above.

C

9) Isotopes differ in the number of what particle?

A) beta particles

B) protons

C) electrons

D) neutrons

E) gamma particles

D

10) How many neutrons are in arsenic?

A) 33

B) 41

C) 42

D) 41.9

E) 75

C

11) Identify the largest atom or ion of carbon by mass.

A) $p^+ = 6$ $n^0 = 6$ $e^- = 6$

B) $p^+ = 6$ $n^0 = 7$ $e^- = 6$

C) $p^+ = 6$ $n^0 = 6$ $e^- = 7$

D) $p^+ = 6$ $n^0 = 6$ $e^- = 5$

E) None of the above.

B

12) Which of the following elements is a halogen?

- A) Ne
- B) I
- C) O
- D) Mg
- E) K

B

13) Calculate the atomic mass of element "X", if it has 2 naturally occurring isotopes with the following masses and natural abundances:

| | | |
|------|-------------|--------|
| X-45 | 44.8776 amu | 32.88% |
| X-47 | 46.9443 amu | 67.12% |

- A) 46.26 amu
- B) 45.91 amu
- C) 46.34 amu
- D) 46.84 amu
- E) 44.99 amu

A

14) How many silver atoms are contained in 5.75 moles of silver?

- A) 6.23×10^{24} silver atoms
- B) 2.26×10^{24} silver atoms
- C) 1.61×10^{23} silver atoms
- D) 2.44×10^{26} silver atoms
- E) None of the above.

E

15) How many moles of Kr are contained in 398 mg of Kr?

- A) 4.75×10^{-3} moles Kr
- B) 33.4 moles Kr
- C) 2.11×10^{-4} moles Kr
- D) 2.99×10^{-3} moles Kr
- E) 1.19×10^{-4} moles Kr

A

16) How many electrons does the Al^{3+} ion possess?

- A) 16
- B) 10
- C) 6
- D) 0
- E) 13

B

- 17) A covalent bond is best described as
- A) the sharing of electrons between atoms.
 - B) the transfer of electrons.
 - C) a bond between a metal and a nonmetal.
 - D) a bond between a metal and a polyatomic ion.
 - E) a bond between two polyatomic ions.

18) Which of the following is a molecular element?

- A) Kr
- B) Ag
- C) S
- D) Mg
- E) Ti

19) Calculate the molar mass for $\text{Mg}(\text{ClO}_4)_2$.

- A) 223.21 g/mol
- B) 123.76 g/mol
- C) 119.52 g/mol
- D) 247.52 g/mol
- E) 75.76 g/mol

20) How many atoms of oxygen are contained in 47.6 g of $\text{Al}_2(\text{CO}_3)_3$? The molar mass of $\text{Al}_2(\text{CO}_3)_3$ is 233.99 g/mol.

- A) 1.23×10^{23} O atoms
- B) 2.96×10^{24} O atoms
- C) 2.87×10^{25} O atoms
- D) 1.10×10^{24} O atoms
- E) 3.68×10^{23} O atoms

21) Write a **balanced** equation to show the reaction of gaseous ethane with gaseous oxygen to form carbon monoxide gas and water vapor.

- A) $2 \text{C}_2\text{H}_6 (\text{g}) + 7 \text{O}_2 (\text{g}) \rightarrow 4 \text{CO}_2 (\text{g}) + 6 \text{H}_2\text{O} (\text{g})$
- B) $\text{C}_2\text{H}_6 (\text{g}) + 5 \text{O} (\text{g}) \rightarrow 2 \text{CO} (\text{g}) + 3 \text{H}_2\text{O} (\text{g})$
- C) $2 \text{C}_2\text{H}_6 (\text{g}) + 5 \text{O}_2 (\text{g}) \rightarrow 4 \text{CO} (\text{g}) + 6 \text{H}_2\text{O} (\text{g})$
- D) $\text{C}_2\text{H}_6 (\text{g}) + 7 \text{O} (\text{g}) \rightarrow 2 \text{CO}_2 (\text{g}) + 3 \text{H}_2\text{O} (\text{g})$
- E) $2 \text{CH}_3 (\text{g}) + 5 \text{O} (\text{g}) \rightarrow 2 \text{CO} (\text{g}) + 3 \text{H}_2\text{O} (\text{g})$

22) In which set do all elements tend to form anions in binary ionic compounds?

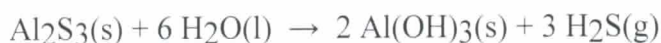
- A) C, S, Pb
- B) K, Fe, Br
- C) Li, Na, K
- D) N, O, I
- E) None of the above

23) What is the mass of a single fluorine molecule, F₂?

- A) 3.155×10^{-23} g
B) 6.310×10^{-23} g
C) 19.00 g
D) 38.00 g
E) 27.00 g

B

24) According to the following reaction, what amount of Al₂S₃ remains when 20.00 g of Al₂S₃ and 2.00 g of H₂O are reacted? A few of the molar masses are as follows: Al₂S₃ = 150.17 g/mol, H₂O = 18.02 g/mol.



- A) 28.33 g
B) 14.00 g
C) 8.33 g
D) 19.78 g
E) 17.22 g

E

25) Determine the percent yield of a reaction that produces 28.65 g of Fe when 50.00 g of Fe₂O₃ react with excess Al according to the following reaction.



- A) 61.03 %
B) 28.65 %
C) 57.30 %
D) 20.02 %
E) 81.93 %

E

26) How many milliliters of a 0.266 M LiNO₃ solution are required to make 150.0 mL of 0.075 M LiNO₃ solution?

- A) 53.2 mL
B) 42.3 mL
C) 18.8 mL
D) 23.6 mL
E) 35.1 mL

B

27) How many chloride ions are present in 65.5 mL of 0.210 M AlCl₃ solution?

- A) 4.02×10^{23} chloride ions
B) 5.79×10^{24} chloride ions
C) 2.48×10^{22} chloride ions
D) 8.28×10^{21} chloride ions
E) 1.21×10^{22} chloride ions

C

28) Determine the number of grams H_2 formed when 250.0 mL of 0.743 M HCl solution reacts with 3.41×10^{23} atoms of Fe according to the following reaction.



- D
- A) 0.374 g
 - B) 1.33 g
 - C) 1.14 g
 - D) 0.187 g
 - E) 1.51 g

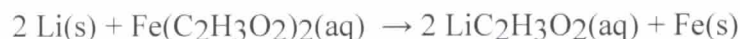
29) Which of the following compounds is **insoluble** in water?

- A
- A) Hg_2I_2
 - B) MgSO_4
 - C) $(\text{NH}_4)_2\text{CO}_3$
 - D) BaS
 - E) All of these compounds are soluble in water.

30) Give the **net ionic equation** for the reaction (if any) that occurs when aqueous solutions of Na_2CO_3 and HCl are mixed.

- C
- A) $2 \text{H}^+\text{(aq)} + \text{CO}_3^{2-}\text{(aq)} \rightarrow \text{H}_2\text{CO}_3\text{(s)}$
 - B) $2 \text{Na}^+\text{(aq)} + \text{CO}_3^{2-}\text{(aq)} + 2 \text{H}^+\text{(aq)} + 2 \text{Cl}^-\text{(aq)} \rightarrow \text{H}_2\text{CO}_3\text{(s)} + 2 \text{NaCl(aq)}$
 - C) $2 \text{H}^+\text{(aq)} + \text{CO}_3^{2-}\text{(aq)} \rightarrow \text{H}_2\text{O(l)} + \text{CO}_2\text{(g)}$
 - D) $2 \text{Na}^+\text{(aq)} + \text{CO}_3^{2-}\text{(aq)} + 2 \text{H}^+\text{(aq)} + 2 \text{Cl}^-\text{(aq)} \rightarrow \text{H}_2\text{CO}_3\text{(s)} + 2 \text{Na}^+\text{(aq)} + 2 \text{Cl}^-\text{(aq)}$
 - E) No reaction occurs.

31) Determine the reducing agent in the following reaction.



- E
- A) O
 - B) H
 - C) C
 - D) Fe
 - E) Li

32) Identify the acid that is in vinegar.

- D
- A) H_2SO_4
 - B) HNO_3
 - C) H_2CO_3
 - D) CH_3COOH
 - E) HF

33) Which of the following is an Arrhenius acid?

A) H_2SO_4

B) LiOH

C) NH_2CH_3

D) CH_3CH_3

E) More than one of these is an Arrhenius acid.

34) Which of the following is a Brønsted-Lowry base?

A) CH_4

B) HCN

C) NH_3

D) Cl_2

E) None of the above are Brønsted-Lowry bases.

35) What is the conjugate acid of HCO_3^- ?

A) H_3O^+

B) H_2O

C) CO_3^{2-}

D) OH^-

E) H_2CO_3

36) The stronger the acid, then which of the following is TRUE?

A) The stronger the conjugate acid.

B) The stronger the conjugate base.

C) The weaker the conjugate base.

D) The weaker the conjugate acid.

E) None of the above.

37) What is the concentration of hydroxide ions in pure water at 30.0°C , if K_w at this temperature is 1.47×10^{-14} ?

A) $1.00 \times 10^{-7} \text{ M}$

B) $1.30 \times 10^{-7} \text{ M}$

C) $1.47 \times 10^{-7} \text{ M}$

D) $8.93 \times 10^{-8} \text{ M}$

E) $1.21 \times 10^{-7} \text{ M}$

38) Calculate the concentration of H_3O^+ in a solution that contains $5.5 \times 10^{-5} \text{ M OH}^-$ at 25°C . Identify the solution as acidic, basic or neutral.

- A) $1.8 \times 10^{-10} \text{ M}$, basic
B) $1.8 \times 10^{-10} \text{ M}$, acidic
C) $5.5 \times 10^{-10} \text{ M}$, neutral
D) $9.2 \times 10^{-1} \text{ M}$, acidic
E) $9.2 \times 10^{-1} \text{ M}$, basic

A

39) Calculate the hydroxide ion concentration in an aqueous solution with a pH of 9.85 at 25°C .

- A) $7.1 \times 10^{-5} \text{ M}$
B) $4.2 \times 10^{-10} \text{ M}$
C) $8.7 \times 10^{-10} \text{ M}$
D) $6.5 \times 10^{-5} \text{ M}$
E) $1.4 \times 10^{-10} \text{ M}$

A

40) Determine the pH of a 0.00598 M HClO_4 solution.

- A) 1.777
B) 6.434
C) 7.566
D) 2.223
E) 3.558

D